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wheat, as barley, rye, grasses, millet, and maize; and the determination of the most favorable form of treatment, particularly with reference to the degree of temperature required, the duration of the immersion in hot water, and the mode of cooling.

KANSAS STATE AGRICULTURAL COLLEGE,
MANHATTAN, KANSAS.

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# OBSERVATIONS ON THE DEVELOPMENT OF SOME FENESTRATE SPORIDIA.

(Plates I & II.)

BY CHARLES E. FAIRMAN.

The following notes have been made on the development of the sporidia in *Fenestella amorpha*, E. & E.,* and in *Patellaria fenestrata*, C. & P.,† A few comparisons have been made with the spore development of *Camarosporium subfenestratum*, B. & C.

In *Fenestella amorpha* we find the first stage of sporidial development to be represented by the formation of a finely granular protoplasmic layer, in the interior of the ascus. Numerous spherical drops may also be seen a little later in this condensed protoplasmic layer. This layer was not seen to impinge upon the walls of the ascus at any point.

A light-colored homogeneous fluid occupied the space between this layer and the walls of the ascus. Also it was noted that the granular layer did not touch the walls of the ascus at the top or apex. At first this layer appears quite homogeneous. We have designated it the *Sporidiogenic layer* (Fig. 1, plate I).

The sporidiogenic layer is generally broader at the apex of the ascus and narrows somewhat towards the base. In *Patellaria fenestrata* the same general characteristics of this layer will be found to exist. In this species the sporidiogenic layer is at times continuous with the base of the ascus, a condition of affairs which was not made out in the case of *Fenestella* (Fig. 14, plate II).

The next feature observed in the development was the formation of larger spherical bodies in the interior of the sporidiogenic layer. These spherical bodies are the first indications of the forming sporidia (Figs. 2, 3, and 4, Plate I, and Figs. 15 and 16, Plate II). In *Fenestella amorpha* the number generally found was 8, and in *Patellaria fenestrata* 4 (although more may be occasionally seen in the latter). As mentioned above, the general outline is spherical, and they seem to be placed at nearly equal distances apart, in number corresponding to the sporidia commonly found in the ascus of the species under consideration. They are the forming or immature sporidia. Nuclei next make their appearance in the primitive sporidia (Fig. 2, Plate I, and Fig. 15, Plate II).

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*Journ. Mycol., Vol. IV, p. 58.

†28th Report N. Y. State Mus., p. 68.

In *Fenestella amorpha*, with the appearance of the nuclei in the immature sporidia, the sporidiogenic layer begins to lose its distinctness of outline and to be either absorbed or resolved.

In *Patellaria fenestrata* the sporidiogenic layer persists longer. (See Fig. 16, Plate II.) Our observations will not warrant a definite answer to the question how long it does remain. It has been suggested that it persists to the full development of the sporidia and forms a mucous coating to the sporidia (of *Patellaria*). Peck, in 28th Rep. N. Y. State Museum, page 68, says of this species: "Asci subclavate, spores four to eight *involved in mucus*, large pyriform," and gives later as one of the points of distinction between this species and *Patellaria dispersa*, Ger., that "the spores are longer in proportion to their breadth and involved in mucus." The nuclei increase in number, but this increase is variable in different species and probably in the same species. The number of separate divisions in the matured sporidia corresponds closely with the number of nuclei formed during the process of segmentation of the sporidia.

In *Fenestella amorpha* from 5 to 7 nuclei form inside the sporidia, in *Patellaria fenestrata* 7 or more, in *Camarosporium subfenestratum* spores from 4 to 7. (Fig. 19, Plate II.)

The nuclei now enlarge and fill up the sporidia. Some of them subdivide into two or more. In *Fenestella amorpha* the majority subdivide. In *Camarosporium subfenestratum*, as far as observed, the nuclei do not all subdivide. Generally a few near the middle of the spore subdivide.

Up to the commencement of this stage the sporidia of *Fenestella amorpha* are hyaline or subhyaline; but with the subdivision of the contents of the sporidia we find a decided darkening in color. In *Patellaria fenestrata*, and in *Camarosporium subfenestratum* also, the same change of color becomes noticeable. As the development of the sporidia progresses the color gradually darkens.

With the increase in size of the divisions of the sporidia and the changes in the secreted cell walls we now have in *Fenestella amorpha* very dark-colored sporidia, whose *transverse septa* correspond to the limits of the first formed nuclei, and the *longitudinal septa* to one or more of the subdivisions of the same.

In *Fenestella amorpha* the longitudinal septum is irregular; where the subdivisions number three the longitudinal septum runs between them, so that we have one on one side and two on the other, and where the subdivisions are four, two will be found on each side of the septum.

To recapitulate.

The development of fenestrate sporidia may be divided into three stages, viz:

First. The formation of the sporidiogenic layer.

Second. The segmentation of the immature sporidium.

Third. The maturation.

JOURNAL OF MYCOLOGY, U. S. DEPARTMENT OF AGRICULTURE, 1890. PLATE I.

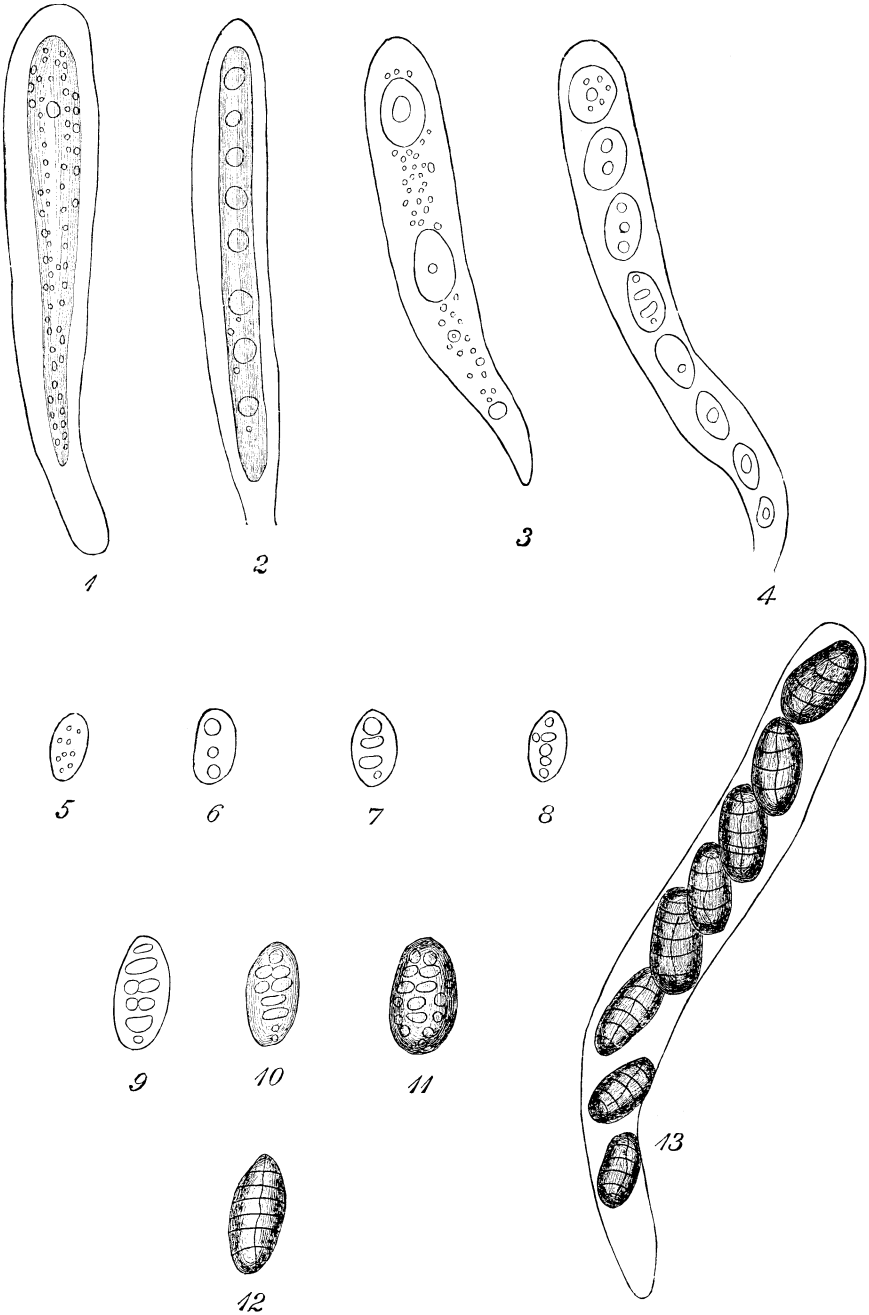

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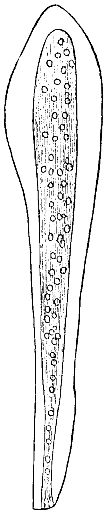
PLATE II.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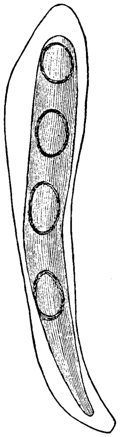
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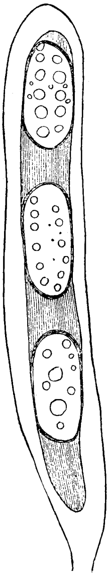
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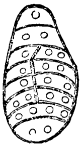
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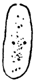
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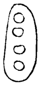
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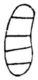
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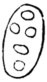
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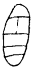
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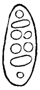
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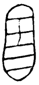
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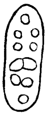
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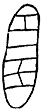
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1/10 Millimeter.

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## EXPLANATION OF PLATES.

### PLATE I.

FIGS. 1 to 13. Development of sporidia of *Fenestella amorpha.*
1. Formation of sporidiogenic layer.
2, 3, and 4. Primitive sporidia.
5–12. Stages in sporidial development.
13. Mature ascus and sporidia.

### PLATE II.

FIGS. 14–17. Sporidial development of *Patellaria fenestrata.*
14. Formation of sporidiogenic layer.
15–16. Formation of primitive sporidia.
17. A nearly developed sporidium.
18–26 represent stages in development of spores of *Camarosporium subfenestratum.*
The scale applies to both plates.

## NEW SPECIES OF FUNGI.

### BY J. B. ELLIS AND B. T. GALLOWAY.

ÆCIDIUM CREPIDICOLUM, *n. s.* On leaves of *Crepis acuminata,* Helena, Mont., June, 1889. Rev. F. D. Kelsey, No. 98. Amphigenous, small, clustered but not crowded, often subcircinate around a vacant space in the center, hemispheric and closed at first, soon open, peridium thin, white, margin narrowly reflexed, at length lacerate cleft nearly or quite to the base. Spores subglobose, 20–24$\mu$, varying to ovate and elliptical, 20–30 by 15–20$\mu$ (smooth ?) with a rather thick epispore. The leaf is slightly thickened in the affected spots. Clusters 2–3 milimeters in diameter, few on a leaf, or smaller (3–6 æcidia together) and then more numerous. Differs from *Æcidium crepidis,* Thüm. in having the æcidia mass deeply buried in the leaf. *Æcidium Rostruppii,* Thüm. has the æcidia larger, but possibly our plant may not be distinct from *Æcidium Barkhausiæ,* Roum.

USTILAGO (SOROSPORIUM ?) BRUNKII, *n. s.* In sheaths of *Andropogon argenteus,* destroying the inflorescence. College Station, Brazos County, Tex. H. S. Jennings. Inclosed in the sheaths without any distinct membranaceous covering. Spores globose or ovate, 10–18$\mu$, in diameter, often apiculate, olivaceous brown under the microscope, finally subopaque. Epispore smooth, thick (3–4$\mu$). The spores are partially agglutinated and hence are not as loosely pulverulent or dusty as in most species.

SOROSPORIUM ELLISII, Winter, var. PROVINCIALIS, *n. var.* In inflorescence of *Andropogon provincialis.* Saline County, Mo. (Demetrio), and Custer County, Nebr. (Webber). Differs from the original speci-